

Shallow Trench Isolation Process Flow

1. Pad Oxide
2. Nitride: trench etch hard mask and CMP stop layer
3. Island mask
4. Trench etch
5. Oxide liner: corner rounding
6. Trench fill
7. Densification (can be skipped)

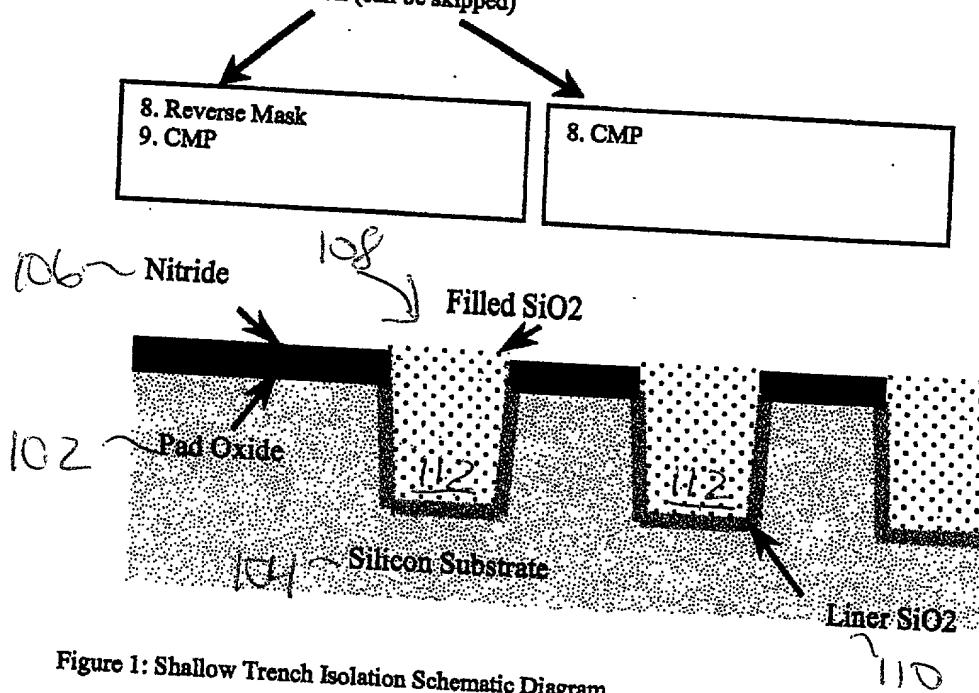


Figure 1: Shallow Trench Isolation Schematic Diagram.

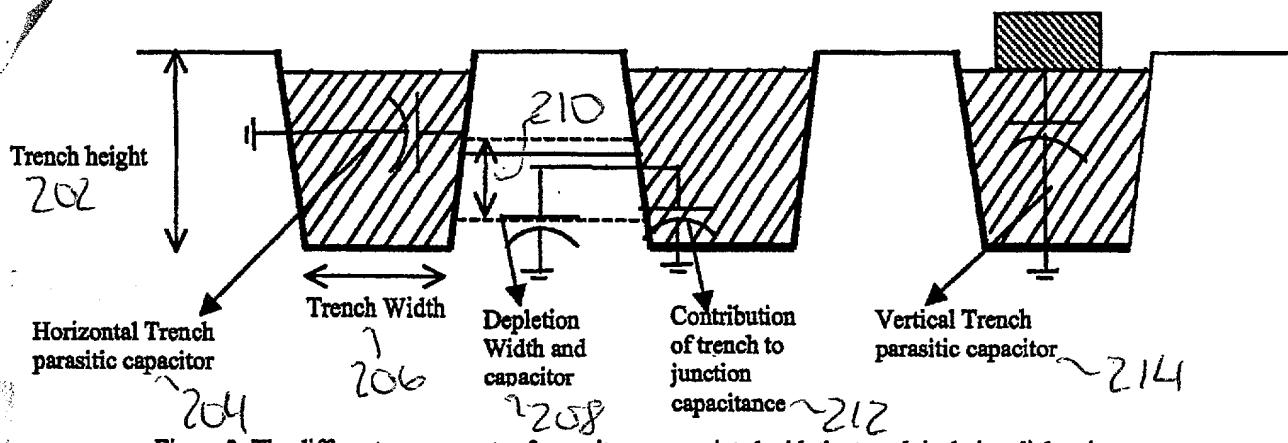


Figure 2: The different components of capacitance associated with the trench isolation dielectric.

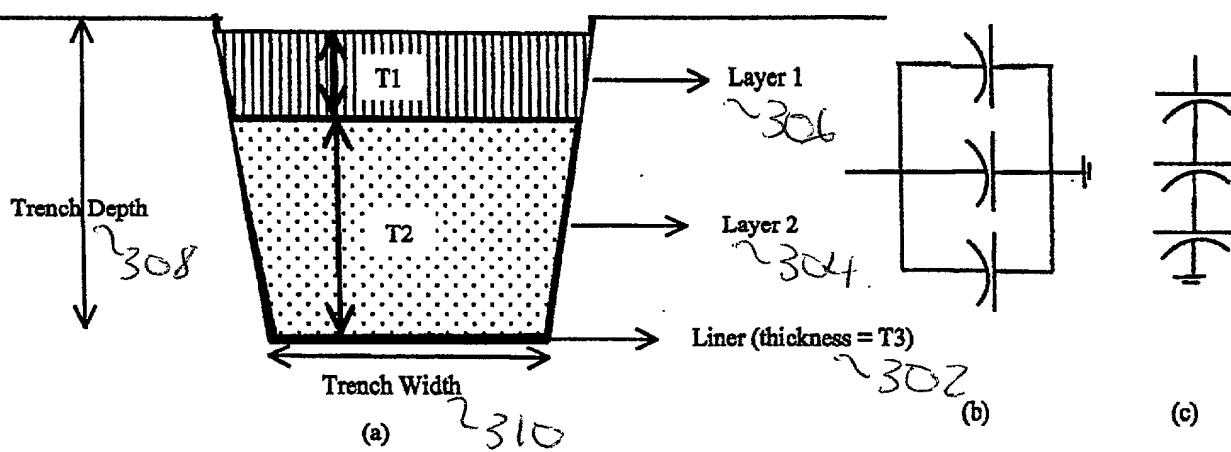


Figure 3: (a) The new trench isolation scheme using multiple trench fill materials, (b) the capacitance from the trench as seen by two adjacent islands, and (c), the capacitance seen in the vertical dimension.

404
406
408
410
412
414

Total Capacitance Effective

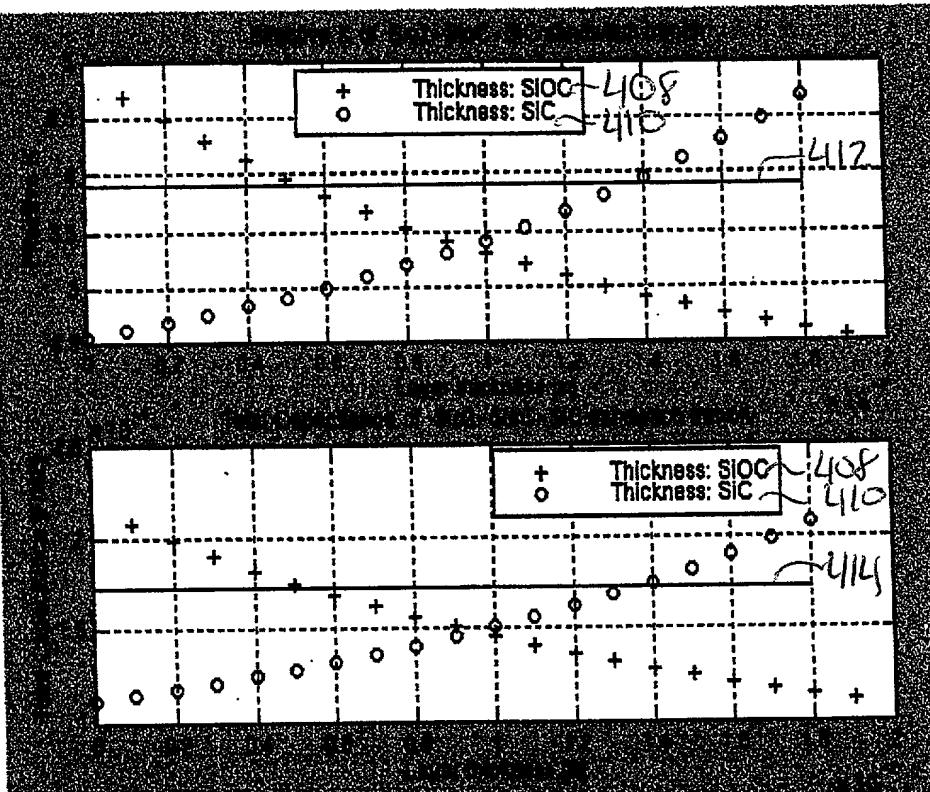


Figure 4: Effective dielectric constant and capacitance of the vertical parasitic trench capacitor with varying thickness of the two component layers.

504
506
508
510
512
514

Total Capacitance Effective

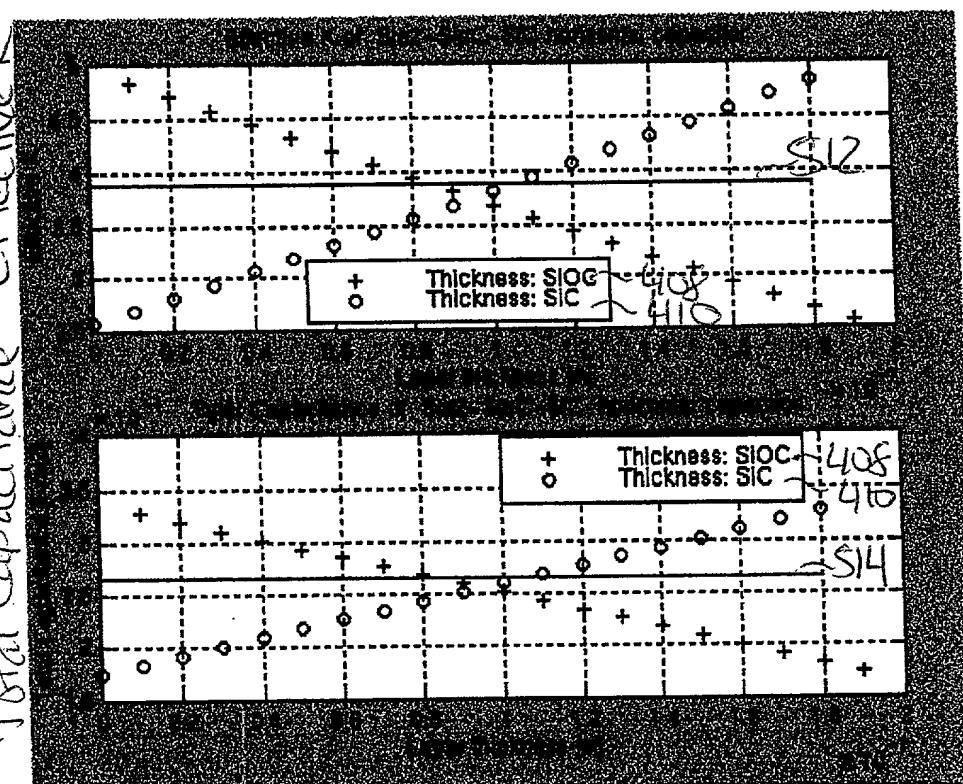


Figure 5: Effective dielectric constant and capacitance of the horizontal parasitic trench capacitor with varying thickness of the two component layers.